PULMONEX II XENON SYSTEMS

OPERATION MANUAL

132-502
132-503
132-522
132-523

BIODEX
Biodex Medical Systems, Inc.
20 Ramsay Road, Shirley, New York, 11967-4704, Tel: 800-224-6339 (*In NY and Int'l, call 631-924-9000),* Fax: 631-924-9338, Email: sales@biodex.com, www.biodex.com

FN: 05-241 8/05

PULMONEX II XENON SYSTEMS

This manual covers installation and operation procedures for the following Biodex products:

#132-502	Xenon System, Pulmonex II, Single Trap, 115 VAC
#132-503	Xenon System, Pulmonex II, Double Trap, 115 VAC
#132-522	Xenon System, Pulmonex II, Single Trap, 230 VAC
#132-523	Xenon System, Pulmonex II, Double Trap, 230 VAC

NOTE: All or some of the following symbols, cautions, warnings and notes may apply to your Atomlab 950 and correspond to this operation manual:

Symbol	***Meaning***
⚠	*Attention, consult accompanying documents.*
⚠	*Symbol signification: Attention, se référer à la notice.*
⚠	*Warning: Injuries to health may result from incorrect or excessive training.*
⚠	*Attention, incorrect ou extrême entrainement peut aboutir des lesíons au santé.*

NOTE: Circuit diagrams for this product are available upon request.

TABLE OF CONTENTS

1. Introduction 4
2. Set-up Procedure 5
3. Performing a Study 6
4. Maintenance 8
   - General Maintenance Procedures 8
   - Maximizing Charcoal Trap Efficiency 8
   - Charcoal Trap Replacement Procedure 9
   - Upper Blower Replacement 10
   - Lower Blower Replacement 11
   - Leak Tests 12
   - Pulmonex II Tubing Set-Up 12
   - Manual Trap Test (without monitor) 13
5. Trouble-shooting 14
6. Specifications 17
7. Replacement 18
8. Schematics 21

INTRODUCTION

The combination of manual and electronic controls make the Pulmonex II Xenon Single and Double-Cartridge Systems the easiest units to use for regional ventilation studies. All internal circuitry, valves and tubing have been designed to afford simple operation with complete patient comfort. The result is a system that provides maximum, reliable test results with minimal effort.

For departments performing up to 15 Xenon studies per month (upper dosage = 10 - 12 mCi), the Single-Cartridge Pulmonex II is ideal. For higher volume departments with more frequent Xenon studies or higher dosages, the Double-Cartridge Pulmonex II is recommended. The Double-Cartridge system provides a longer migration path for the Xenon effluent, allowing greater decay and absorption before exhaustion.

Before using either Pulmonex II system on an actual patient, we suggest you first make several dry runs through the following operation procedures (without using Xenon). Having become familiar with the operating routine, ask a colleague to stand-in as a practice patient and try the procedures again. Once you feel fully comfortable operating the Pulmonex II, you'll be able to perform Xenon studies on any patient with complete confidence.

NOTE: Because the Pulmonex II uses a temperature-sensitive valve which must acclimate to the immediate environment, the system must reside for several hours in the department where it will be used prior to performing any studies.

NOTE: The following symbol on your Biodex Pulmonex II System corresponds to this Operation Manual.

NOTA: Le symbole ci-dessous sur votre système BIODEX se réfère à la notice d'utilisation.

SYMBOL	***MEANING***
	Attention, consult accompanying documents.

SYMBOLE	***SIGNIFICATION***
	Attention, se référer à la notice de l'appareil.

SET-UP PROCEDURE

(See Figures 1 - 3.)

1. Open lower front door. All hoses should be connected to their respective ports. (See Figure 1.)

2. Open the top door. The Pulmonex can use either of two different style Drierite cartridges. A refillable plastic cartridge is shipped with your unit, it is located on the right side of the compartment. You can fill this cartridge to one-third full with loose Drierite (catalog #139-101). Alternatively, you can remove this cartridge and replace it with the sample pre-filled single use cartridge included in the sample Xenon Disposable Convenience Kit supplied. In either case, the disposable blue Drierite cartridge prolongs charcoal trap life span. Failure to change the moisture absorber regularly will significantly shorten the life span of the charcoal trap, therefore, it is recommended that you change it after every study. (See Figure 2.)

3. Located on the left side of the top compartment is the Soda-Lime cartridge. This cartridge serves as a carbon dioxide trap. You can fill this cartridge to one-third full with loose Soda-Lime (catalog #130-019). Alternatively, you can remove this cartridge and replace it with the sample white pre-filled single use cartridge included in the sample Xenon Disposable Convenience Kit supplied. In either case, the Soda-Lime cartridge helps stop the breakdown of Soda-Lime granules that may possibly clog the 10-way valve and hinder patient air flow. Failure to change the Soda-Lime regularly could cause the patient to hyperventilate, therefore, it is recommended that you change it after every study.

   NOTE: The flow arrow on the pre-filled Soda-Lime cartridge should match the flow label in the Pulmonex II cabinet.

4. Bring the unit to the area of operation. Ensure the Power Switch is OFF and the timer is on "0". Plug into a near by electrical outlet.

5. At the rear of the unit, there are two black hose connections positioned side by side. (See Figure 3.) The blue hose adapters in the open ends of hoses should be removed to connect to these fittings. The blue adapters are required to connect to the Hans Rudolph Valve and to old Pulmonex only. Attach the 1.125" bore hose and Hans Rudolph Valve assembly to the hose connectors so that air flows into the Hans Rudolph Valve on the left and out from the Hans Rudolph Valve on the right. Connect the bacteria filter directly to the Hans Rudolph Valve. Attach either a face mask or mouthpiece directly to the bacteria filter.

   NOTE: Keep the breathing tubes as short as possible. (See "Trouble-shooting" Strong Breathing Resistance.) For supine patients, bring the system as close as possible to the bedside.
   As a safety precaution you can connect a hose from your room vent to the exhaust port located just below the overhang on the patient side of the Pulmonex II.

   CAUTION: Some patients are sensitive to Oxygen. Consult a physician before using Oxygen. If the physician prefers, substitute room air for Oxygen.

   ATTENTION: Certains patients réagissent à l'oxygène. Se référer à un médecin avant d'utiliser de l'oxygène. Utiliser l'air ambiant quand indiqué.

6. To add Oxygen, connect and clamp a .25" Oxygen hose from your supply to the Oxygen inlet port on the Pulmonex II front panel.

   CAUTION: Do NOT use humidified Oxygen.

   ATTENTION: Ne pas utiliser d'oxygène contenant de la vapeur d'eau.

7. Ensure that the shipping cap is removed from the exhaust port located on the lower cabinet on the rear of the unit (facing the patient).

Figure 1.
Ensure all hoses in lower cabinet are properly connected.

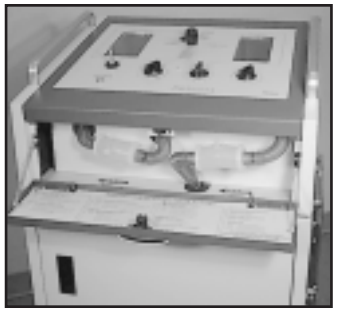


Figure 2.
The Carbon Dioxide absorber and moisture absorber cartridges are located in the upper cabinet

Figure 3.
Connectors for the 1.125" bore hose and Hans Rudolph Valve assembly are located on the back panel.

PERFORMING A STUDY

(See Figure 4.)

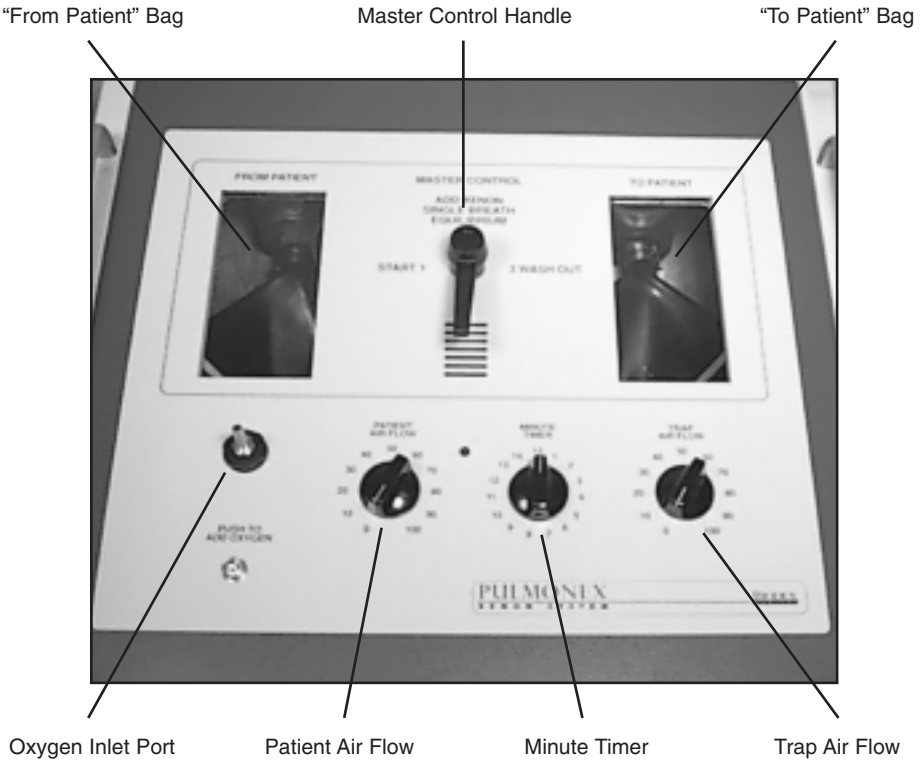


Figure 4.
The Pulmonex II
Display Panel

NOTE: Oxygen input should not exceed eight psi. Oxygen input flow rate should be six to eight litters/minute not to exceed 50 liters/minute.

1. Using a source, position the patient in front of the scintillation camera. Ensure both lungs are within the crystal area.
2. Set the camera for Xe-133. Record all data on tape.
3. Turn the Power Switch, located on the patient side of the unit, to ON. (0 is OFF, 1 is ON.)

   NOTE: Even after the Power Switch is set to the ON position, power will not be evident until the Timer has been turned ON.
4. Place the Pulmonex II as close to the patient as possible and set the handle to the "Start" position.
5. Set "Patient Air Flow" control to 30 (an arbitrary figure that can be changed to accommodate the patient's breathing pattern).
6. Press the button on the front panel to add Oxygen to the "To Patient" bag. Only add a small amount of Oxygen, about one quarter full. (The bag will only move slightly, do not fill it up.) More Oxygen can be added later if it is required for the patient. In many cases, it is possible not to add any Oxygen and perform the entire study on ambient air. In all cases, the Oxygen is only to enrich the air in the circuit.

   NOTE: To perform a study using ambient air, turn the Pulmonex II ON using the timer and proceed to handle position #2 before connecting the patient to the system. When the "To Patient" bag is one-quarter full, switch the handle back to position #1. To add ambient air, turn the Air Flow up to 100, add the desired volume, and turn the Air flow back to 30. The system is now ready to use.
7. Make sure the system is in position #1.
8. Set the timer to nine minutes (an arbitrary figure that can be changed at any time depending on the study procedure you prefer).
9. Place the face mask over the patient's face and attach mask retainer or mouthpiece and nose clip. Place a Vertex Cape on the patient.
10. With the handle in the "Start" position. Instruct patient to breathe briefly while becoming accustomed to the face mask. The "From Patient" bag will move slightly as the patient exhales.

11. Switch the handle to single breath, "Equilibrium" position #2. Use either the DuPont Calidose Gun or a syringe filled with Xenon, and puncture the injection site of the face mask or mouthpiece. Add the Xenon as you have the patient take a deep breath. Instruct patient to hold breath for as long as possible. After exhaling the patient should resume normal breathing while you increase the “Patient Air Flow” control to 50 (an arbitrary figure that can be changed to accommodate the patient’s breathing pattern).

    Advise the patient to breathe normally. Observe breathing bags moving through the front panel windows. Add Oxygen if necessary for patient comfort.

    NOTE: If the Xenon is not getting to the patient for single breath, on future studies lower the “Patient Air Flow” control to 10 or 20 for approximately five seconds before Xenon administration. Instruct the patient to exhale and add the Xenon while the patient inhales.

12. Once the patient reaches equilibrium (one to two minutes, the counting rate on the camera stabilizes), switch to “Washout,” position #3. Take washout data on the camera (typical framing: first picture, 15 seconds; second, 30 seconds; third, 60 seconds). Have the patient breathe normally.

13. Carefully watch the “From Patient” bag. If it starts blowing up, the patient is breathing too fast. Advise normalized breathing and increase the “Patient Air Flow” speed. If the bag continues to expand up towards the glass, the patient will feel back pressure and resistance. To relieve this effect, increase “Trap Air Flow” by turning the Trap Flow knob clockwise until the breathing bag deflates. Return the control to approximately one-half of its range when the study is complete. The use of this trap motor control will be a rare occurrence. Do not adjust unless absolutely necessary and be sure to return it to its original position. To be effective, the increase in motor speed must be accomplished before the bag is full, thus, it is vital to watch the “From Patient” bag carefully during washout.

    NOTE: If the motors are running too fast it may be difficult for the patient to breath in.

14. When the washout is complete, remove the patient from the system. Allow the system to run for a few more seconds or until both bags are empty.

MAINTENANCE

General Maintenance Procedures

1. Change the moisture absorber and the soda-lime (CO^2 absorber) after every study. If you wait until the granules change color, efficiency is already greatly reduced. Absorber granules can also break down in size and the smaller granules and powder clog the system, hinder patient air flow and damage system circuitry. Refillable cartridges (#132-555) are available.

2. Administer the Xenon as close to the patient as possible. Having the Xenon enter the patient near the face mask or mouthpiece ensures a good bolus for single breath. We recommend using an injection adapter as close to the patient as possible.

   Biodex carries an entire line of disposable Xenon circuits, some with injection adapters, with luer lock fittings, or injection ports (see catalog). These options will allow the use of a Xenon gun, Xenon injection dispenser or syringe directly in line with the patient's breathing passage.

3. Test the trap effluent on a regular basis. Keep a formal record according to NRC regulations. The easiest and most efficient way to test the trap is by using the Xenon Trap Monitor (catalog #136-752). If you do not have a monitor, refer to the Leak and Trap Test procedure explained later in this chapter.

4. Periodically remove the two breathing tubes from the back of the unit. Take one tube and connect it to both ports, forming a C configuration. Place the handle in position #2 and press the Oxygen button until the bags are full and tight up against the glass windows. They should remain full for approximately two minutes. If they sag or fail to blow up tight, the system may have a leak. Refer to the Leak and Trap Test procedure as explained later in this manual.

Maximizing Charcoal Trap Efficiency

It is recommended that the Charcoal (catalog #132-319) be replaced once every 12 months. To maximize trap effectiveness follow these guidelines:

1. After the patient has completed the washout, do not leave the system running for more than ten seconds.

2. Monitor the lower blower motor. It should be set at a maximum of 50-60 and only increased when a patient needs assistance during washout.

3. Change the moisture absorber after every study!

NOTE: Do not leave the Pulmonex II in position #3 when not in use.

Charcoal Trap Replacement Procedure for Single Trap Units

(See Figure 5.)

Tools Required: Screwdriver, pliers and/or vice grip.

1. Open the door to the trap and, using a screwdriver (or, if need be, a pair of pliers,) disconnect hose clamps and tubes connected to the top of the lead cartridge.
2. Unscrew the knob holding the cartridge in place.
3. Check the direction of the fittings on the top of the lead cartridge before removing it.
4. Remove the old cartridge and place the new cartridge into the system. Make sure the fittings on the cartridge point in the same direction as on the one you removed.
5. Replace the bracket and knob.
6. Connect the tubing and the hose clamps to their respective fittings.
7. The system is now ready for use.
8. Perform a mock study on yourself (without Xenon) to check the system's operation.

NOTE: Be sure to use a bacteria filter.

NOTE: For Dual Trap Units, remove the right side trap, move the left trap to the right trap position, and install the new trap on the left side.

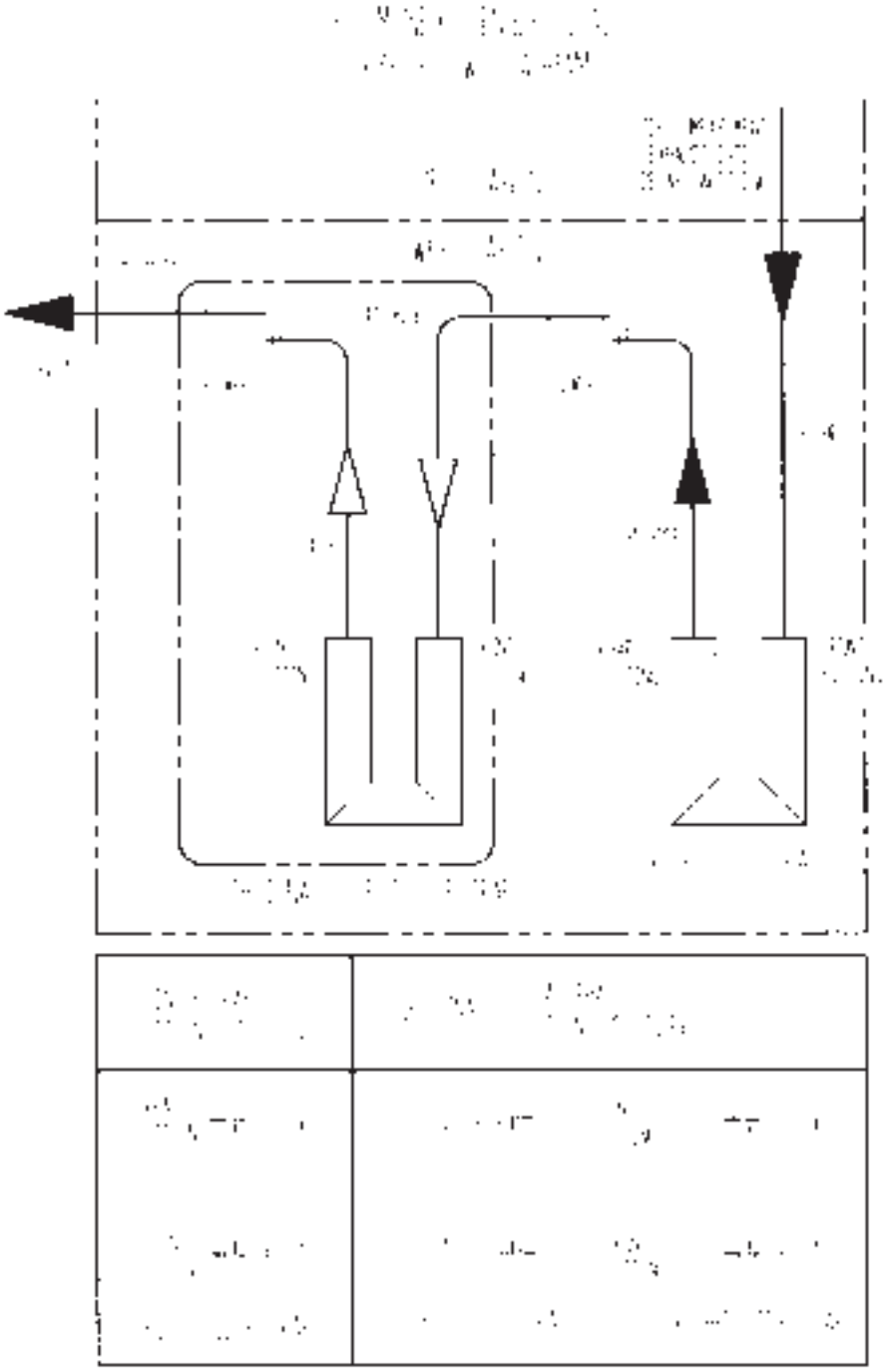


Figure 5.
Charcoal Trap Replacement

Upper Blower Replacement

Tools Required: Slip-joint pliers, flat-blade screwdriver and ten-inch wood block.

The Upper Blower is located in the upper cabinet, adjacent to the main valve system.

To Remove the Old Blower:

1. Unplug the Pulmonex from the wall.
2. Using flat-head screwdriver, remove eight screws from stainless steel front panel edges.
3. Carefully raise front panel approximately ten inches. Use a block of wood to prop up the front cover at rear of unit.
4. Disconnect the Molex power connector that connects the cable running to the lower cabinet.
5. There are three hoses that must now be disconnected to facilitate complete removal of the front panel. The first two hoses go to the rear of the unit to the fittings for the patient hose set. Using slip-joint pliers loosen spring clamps and remove hoses (inside of cabinet). The third hose is located mid-line in the cabinet and goes to the thru-wall fitting for the trap.
6. After all of the hoses have been removed, remove the front panel assembly and carefully place it aside (upside down).
7. Using slip-pliers, loosen the hose clamps connecting two smaller hoses to blower. Remove and label both hoses.
8. Disconnect large hose from between valve and blower.
9. Disconnect the Molex connector.
10. With flat-head screwdriver, remove three screws from blower bracket and remove the Upper Blower.

To Attach the New Blower:

1. Position new blower so that hose fittings face front of Pulmonex II cabinet.
2. With flat-blade screwdriver, install three screws in bracket to attach new blower.
3. Reconnect Molex connectors. Using spring clamps and fittings, attach two smaller hoses to blower, as labeled in step #6 above, and the larger hose to the 10-way valve. Fitting and connectors should be sealed with RTV® silicon-adhesive or similar sealant.

   NOTE: The silicone sealant should be put on the fittings before attaching the hose.
4. Reposition front panel. Reattach the front panel Molex connector. Reattach the two hoses to back of unit for patient set. Reattach smaller hose to thru-wall fitting for trap. Using flat-blade screwdriver, reinstall eight screws to secure front panel.
5. After the silicon has dried, perform Leak Test “A”, described later in this chapter, to ensure unit is operating properly.

Lower Blower Replacement

(See Figure 6.)

Tools Required: Slip-joint pliers and flat-blade screwdriver.

The Lower Blower is located in the lower cabinet and accessible from the lower cabinet door.

To Remove the Old Blower:

1. Unplug the Pulmonex from the wall.
2. Using slip-pliers, loosen hose clamps connecting corrugated tubes to blower.
3. Disconnect the Molex connector.
4. Using flat-blade screwdriver, remove three screws that attach the lower blower to the back of the cabinet. Save screws.

To Attach the New Blower:

1. Position new blower so that hose fittings are on left as you face the cabinet. Attach blower to back of cabinet with three screws removed earlier.
2. Connect the upper hose fitting to exhaust tubing.
3. Connect the lower hose fitting to trap tubing.
4. Reconnect the Molex connector.
5. Plug unit back into wall.
6. Test operation using Turn-On Timer switch.
7. Increase air flow setting to 100.
8. Place hand near exhaust port at back of unit and feel for positive air flow.

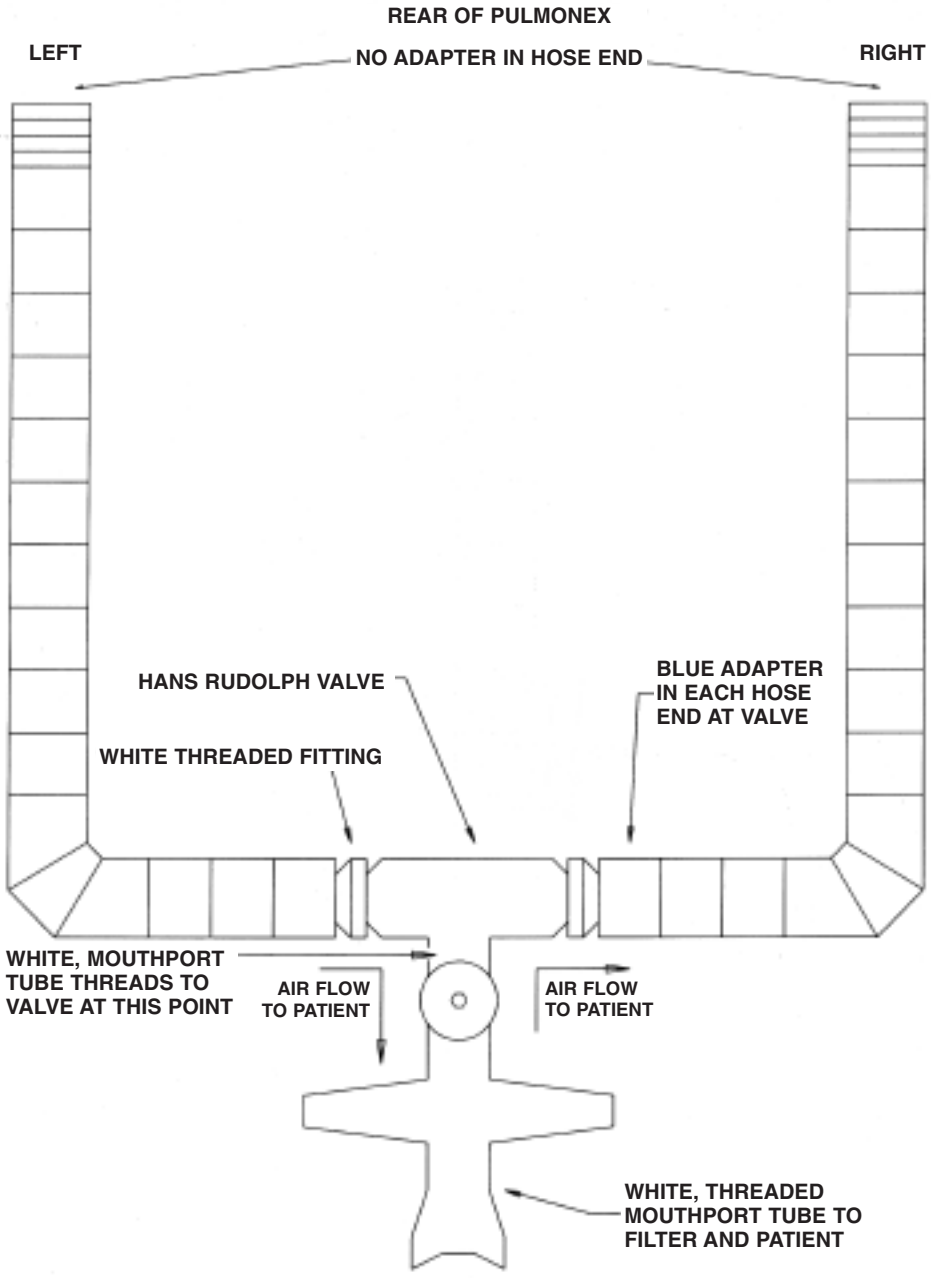

REAR OF PULMONEX
LEFT
NO ADAPTER IN HOSE END
RIGHT
HANS RUDOLPH VALVE
BLUE ADAPTER IN EACH HOSE END AT VALVE
WHITE THREADED FITTING
WHITE, MOUTHPORT TUBE THREADS TO VALVE AT THIS POINT
AIR FLOW TO PATIENT
AIR FLOW TO PATIENT
WHITE, THREADED MOUTHPORT TUBE TO FILTER AND PATIENT

Figure 6.
Lower Blower Replacement.

Leak Test

The following procedures are a simple yet effective means of testing the delivery and breathing portion of the Pulmonex II system for leaks. Tests A and C should be done with the Pulmonex II turned OFF.

Test A: (Be sure Pulmonex is turned OFF).

1. Connect one hose between the “To Patient” port and the “From Patient” port located on the patient side of the system.
2. With the system in position #2 and the Oxygen supply connected, depress the “Add Oxygen” button on the front panel of the system and fill until both bags are full and pressed up against the front viewing windows.
3. Turn OFF the Oxygen supply. Listen carefully for any leaks (the bags should remain full for at least one minute.) If no leak is found, empty the bags, and replace outside tubing.
4. If a leak is suspected, remove the eight screws that hold the front panel in and raise the panel slightly. Now feel inside for any leaks.
5. If a leak is found in the tubing, replace the entire section. Occasionally, one of the breathing bags will tear or a hole will develop in it. These bags are Biodex Medical Systems (catalog #130-610 and are easily replaced. If the leak is in one of the fittings, they can be easily sealed with silicone.
6. If you suspect a leak but it is proving hard to find, move on to test B.

Test B:

1. Turn Pulmonex ON.
2. Connect one hose between the “To Patient” port and the “From Patient” port located on the patient side of the system.
2. Empty both bags by putting into position #3.
3. Put system in position #1.
4. If the “To Patient” bag blows up, very carefully check to see if the big fitting connecting the blower to the 10-way valve is broken.
5. If it is, run a bead of silicone around the fitting to seal it and let dry.
6. Now try steps #2 through #4 again. If the bag does not fill, do a leak test again (Test A).
7. If the bag fills, call Biodex Medical Systems. The 10-way valve probably needs to be replaced (catalog #132-515).

Test C – Oxygen Button Valve Leak Test:

1. With a hose connecting the two patient ports, connect the Oxygen supply and turn it ON.
2. If the “To Patient” bag fills without depressing the “Add Oxygen” button, this valve needs to be replaced.

Pulmonex II Tubing Set-Up

Proper Pulmonex II tubing set-up is as follows: tubing, then Hans Rudolph Valve, then bacteria filter, and then the face mask or mouthpiece placed directly onto the filter. You may add an injection adapter between the filter and mask or mouthpiece. The solid plug or luer lock plug in the Hans Rudolph Valve should be pointing up. The Hans Rudolph Valve should flow in on the left and out on the right.

NOTE: Please remember, if you have any questions or problems, contact our Service Department at 1 (800) 224-6339.

Manual Trap Test (Without Monitor)

Trap exhaust is monitored by using the gamma camera without a collimator. The following simple technique is used:

1. Remove the collimator from the camera.
2. With a five percent window, calibrate for Xe-133.
3. Fill a large plastic bag with a known volume of air (typically, 50 liters).
4. Inject a known quantity of Xe-133 (such as 100 μCi) into the bag. The concentration will be 2×10^{-3} μCi/cm^3.
5. Place the bag in front of the crystal and count for a known period of time. The c/m obtained is a measure of the efficiency.
6. Collect the exhaust of a typical study in another bag of the same volume (50 liters) and count as defined in step #5.
7. Ratio the count rates to the standard taken to determine exhaust concentration.

NOTE: Trap flow rate must be measured on site using a flow meter due to variables such as tubing length, blower speed, trap condition, etc.

Example:

If 2×10^{-3} µCi/cm^3 yields 600,000 c/m above the background and collected effluent from the patient study was 150 c/m above the background, then:

$$\text{Ratio} = \frac{1.5 \times 10^{2} \text{ c/m}}{6 \times 10^{5} \text{ c/m}} = 2.5 \times 10^{-4}$$

$$\begin{aligned}\text{Exhaust Concentration} &= r\ (2 \times 10^{-3}\ \mu\text{Ci/cm}^3 \\ &= (2.5 \times 10^{-4})\ (2 \times 10^{-3}\ \mu\text{Ci/cm}^3) \\ &= 5 \times 10^{-7}\ \mu\text{Ci/cm}^3\end{aligned}$$

*MPC Xe-133 controlled areas should not exceed 1×10^{-5} µCi/cm^3

TROUBLESHOOTING

Problem/Probable Cause	*Solution*
No Power	
1. Timer not ON.	1. Turn timer ON.
2. Power cord cut or broken.	2. Replace cord.
3. No power in outlet.	3. Try different outlet.
4. Incorrectly connected the transformer.	4. Connect properly.
5. ON/OFF switch is OFF.	5. Turn switch to ON (1)
Oxygen Not Getting Into System	
1. Tank or Oxygen supply empty.	1. Refill tank.
2. Flow rate on tank not set high enough.	2. Turn flow rate up.
3. Not holding Oxygen button down long enough.	3. Button must be depressed for the whole time Oxygen is to be added.
4. Internal one-quarter inch hose has come off fittings.	4. Reattach hose and re-clamp.
Xenon Not Getting To Patient For Single Breath	
1. Injection not near the patient.	1. Change injection location to a location closer to the patient.
2. Injected when patient exhaled.	2. Inject after patient exhales and starts inhaling.
3. Lower blower speed set too high.	3. Turn blower speed down to 20 for Xenon being drawn into system at least 30 seconds prior to injection of Xenon.
4. Blower speed not set high enough.	4. After injecting Xenon blower speed should be raised to at least a setting of 50, higher if necessary.
5. Soda-Lime and Drierite cartridges more than one-third full.	5. Cartridges should not be filled too full.
6. Not enough Oxygen supplied.	6. Add more Oxygen. (It can be added at any time during the study.)
7. Too much Oxygen put in the "To Patient" bag to start study.	7. Only fill "To Patient" bag one-third full with Oxygen.
8. Study runs too long.	8. Shorten length of study. Equilibrium should not take any more than five to six minutes.
9. External hose cracked.	9. Replace hoses.

Xenon Not Getting To Patient For Single Breath Equilibrium

1. Gun clogged.	1. Check gun.
2. Injected Xenon in position #1 (start).	2. Inject in position #2.
3. Main valve core not turning when handle is turned.	3. Call Biodex Medical Systems.
4. Bacteria filter absorbs Xenon.	4. Change filter type to recommended filters supplied by Biodex Medical Systems.
5. System leaks.	5. See leak test.
6. Y fitting not set up properly.	6. Correct Y and tubing for proper directional flow.
7. Is camera set for Xenon?	7. Set camera for Xenon.

"To Patient" Bag Fills During Study

1 Leak around face mask or nose clamp when mouthpiece is used.	1. Make sure face mask retainer is tight.
2. External hose cracked.	2. Make sure there is a tight seal around the mouthpiece and that nose clamp is being used.
3. Blower to 10-way valve fitting broken.	3. Replace hose.
4. Oxygen valve leaks.	4. See test B.
	5. Replace Oxygen valve (See procedure to test for leaks, test C).

Low Counts Throughout Study

1. Vial not completely emptying.	1. Check vial before and after study.
2. Not enough Xenon to start study	2. Use bigger doses of Xenon.
3. Gun clogged.	3. Check gun.

Losing Counts

1. Nose clip not being used.	1. Use nose clip.
2. Leak around mouthpiece or face mask.	2. Make sure mask retainer or mouthpiece is secured properly.
3. Cracks in external hose.	3. Replace hose.
4. Bacteria filter is absorbing Xenon.	4. Use Biodex Medical Systems recommended bacteria filters (check filter for activity.)
5. Plug-in injection fitting is not capped.	5. Cap luer lock plug-in injection fitting.

Strong Breathing Resistance

1. Hoses are too long.	1. Reduce length of tubing to 24" maximum for blue corrugated tube or 36" for 1-1.125" smooth-bore hose.
2. Hose on patient's side of Y fitting.	2. Remove hose. Bacteria filter and face mask should be affixed directly to Y fitting.
3. Hans Rudolph Valve (Y or T style) is upside down.	3. Hans Rudolph valve should be attached so that air flows in on the left and out on the right.
4. One-way valves sticking.	4. Replace Y fitting.
5. Blowers running too fast.	5. Reduce blower speed.

"From Patient" bag not emptying during washout

1. Shipping cap not removed from exhaust port.	1. Remove cap from exhaust port.
2. Upper blower speed set too low.	2. Turn speed up to 100.
3. Lower blower speed set too low.	3. Generally, the lower cabinet blower speed is set at 60, however on some patients, it will have to be turned up.
4. Blowers not running.	4. Check power or replace blower.
5. Breathing bags crimped or out of wall brackets.	5. Reattach bags to wall mounts.
6. Charcoal has settled in lead cartridge.	6. Remove cartridge, turn upside down and shake gently, then replace cartridge.

Trap Leaking Xenon

1. Monitor not working.	1. Check trap effluent manually.
2. Crack in seam of cartridge.	2. Seal with silicone.
3. Loose fittings on cartridge.	3. Seal fitting with silicone.
4. Crack in hose to trap or hose is not attached.	4. Replace or reconnect hose.
5. Cartridge saturated.	5. Replace cartridge.
6. Charcoal has settled.	6. Shake cartridge gently to loosen charcoal.

Oxygen Hose Comes Off

1. Input pressure too high.	1. Adjust input pressure to not greater than eight psi.
2. No Clamp for hose at input fitting.	2. Install clamp.

SPECIFICATIONS

Dimensions: 48.5" h x 22" depth x 20.5" w (123.2 x 55.9 x 52.1 cm)
Motor: UL approved. 115 VAC, 50/60 Hz
Electrical Requirements: 115 VAC, 1 amp or 230 VAC, 0.5 amp, 50/60 Hz
Shipping Weight:
132-502: 300 lb (138 kg)
132-503: 375 lb (172.5 kg)
ETL and cETL Listed

Mfg: Biodex Medical Systems
20 Ramsay Road
Shirley, NY 11967

Classification: Class 1, Type B
ordinary equipment

CAUTION: Refer to instructions manual before operating or servicing system.

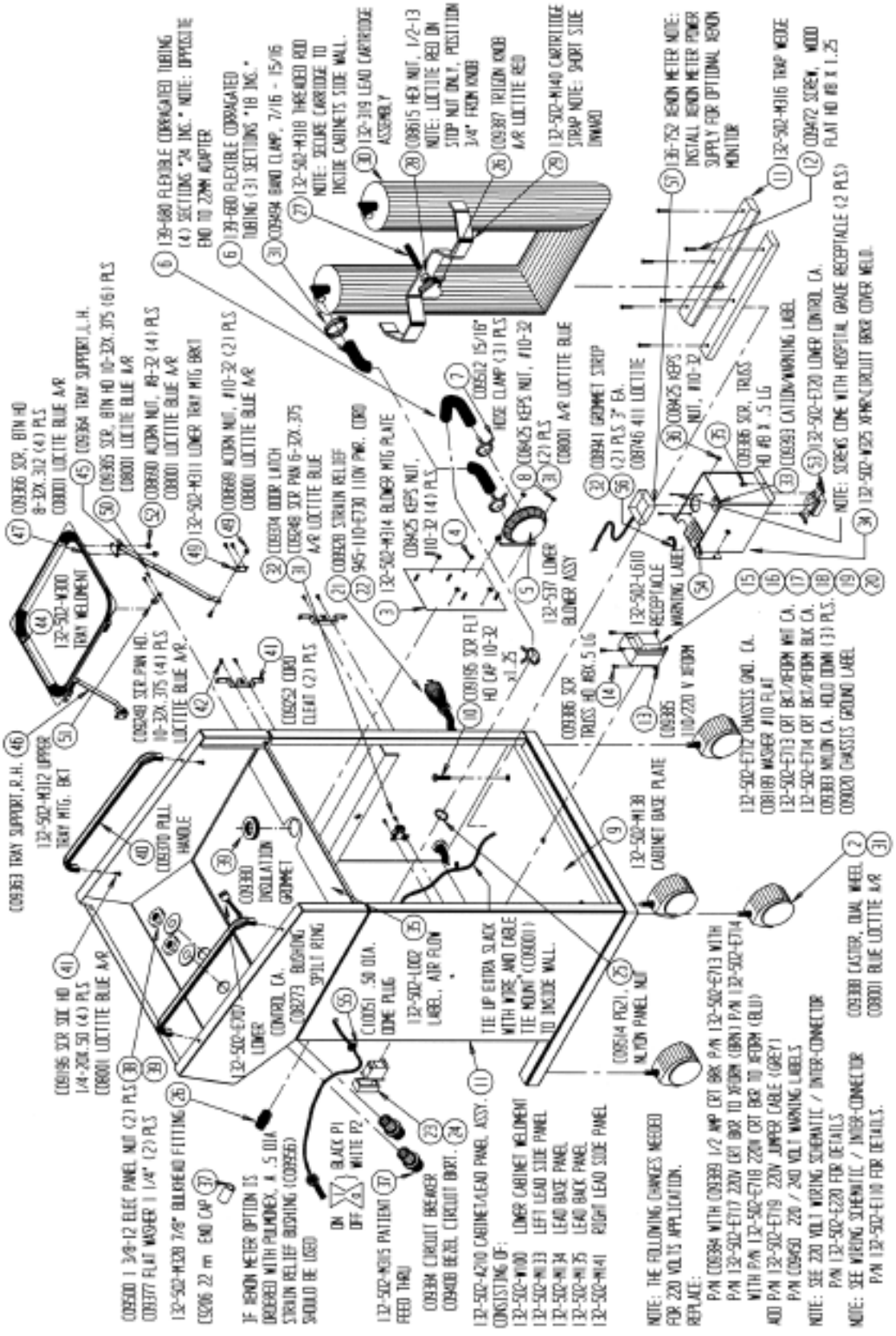
ATTENTION: Se référer à la notice d'utilisation avant d'utiliser l'equipement.

CAUTION: Disconnect power from source before removing panel or covers. Reliable grounding achieved only by connecting this unit to an equivalent marked hospital only or hospital grade receptacle.

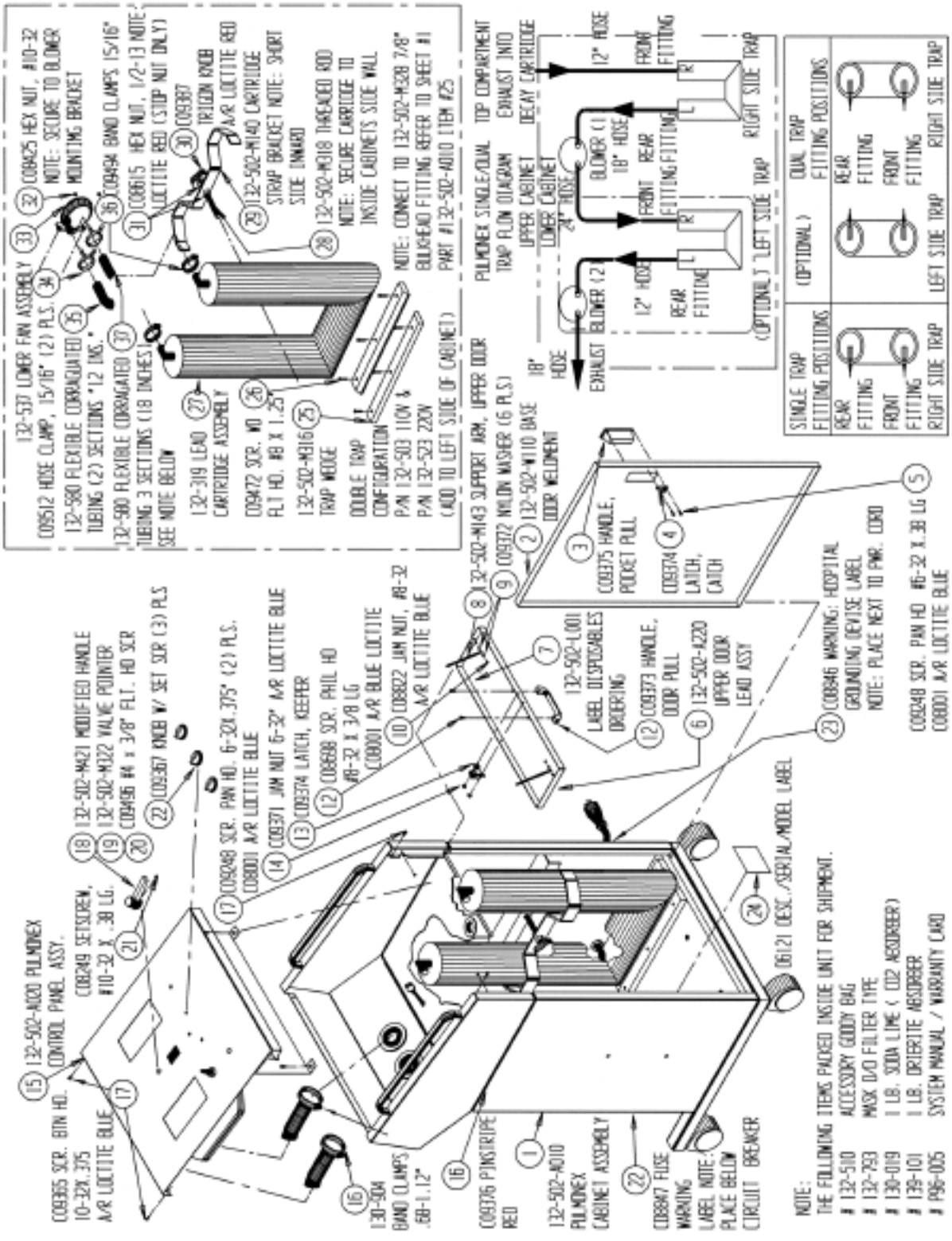
ATTENTION: Déconnecter la prise secteur avant d'ouvrir le coffret.
Une terre fiable ne peut être obtenue que par la connexion à une prise secteur de qualité hospitalière.

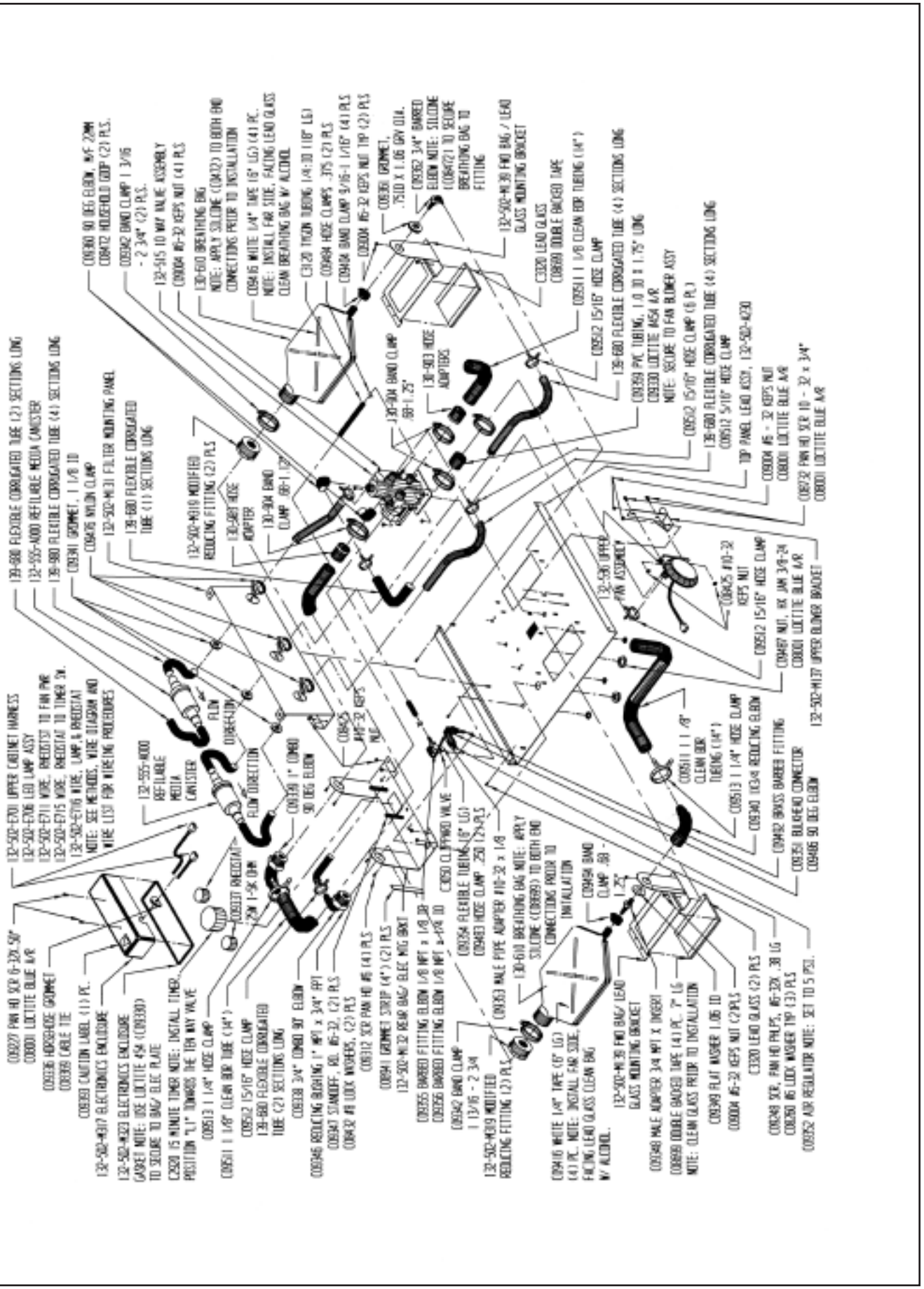
REPLACEMENT

PULMONEX II CONTROL PANEL ASSEMBLY, 132-502-A020

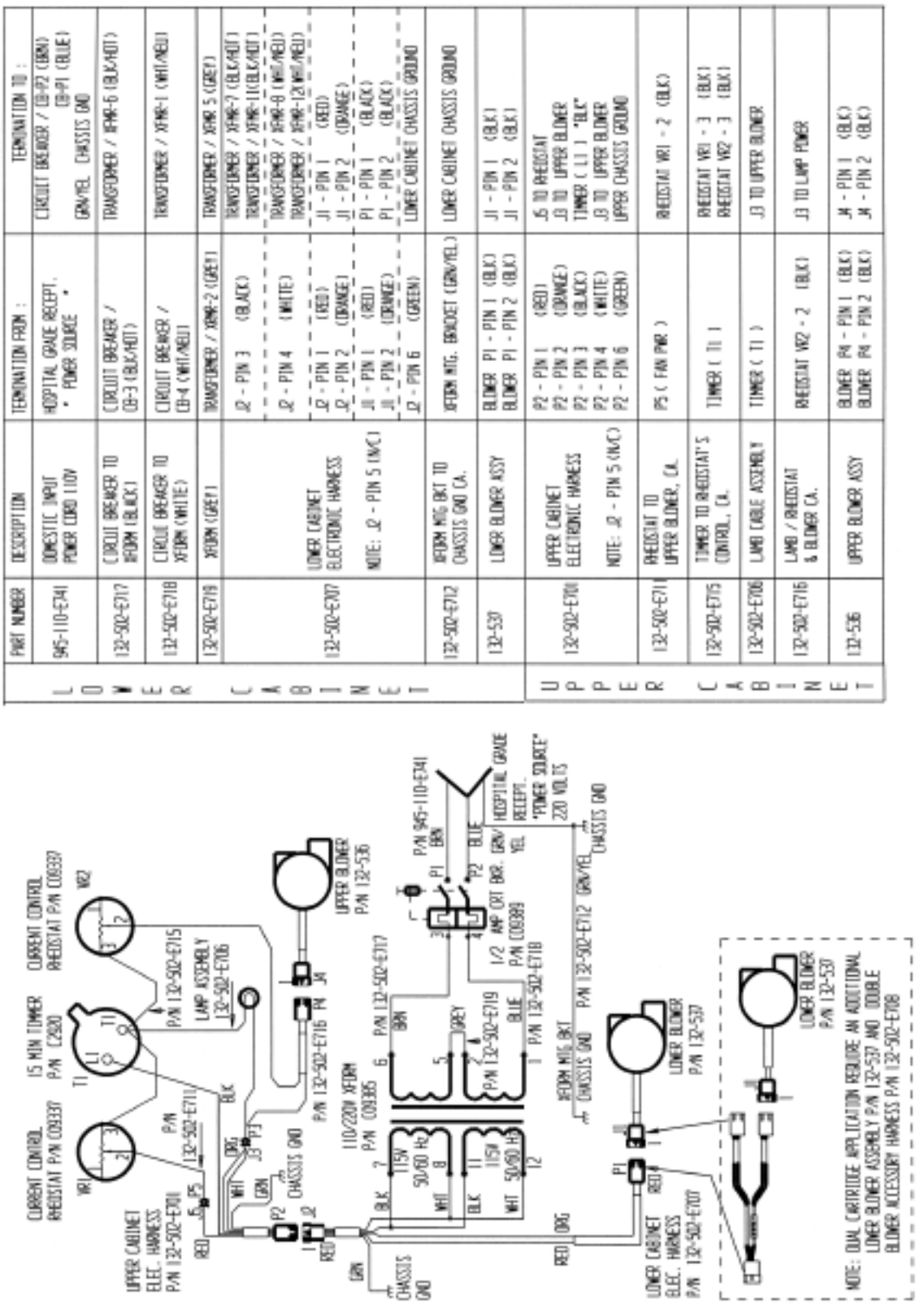


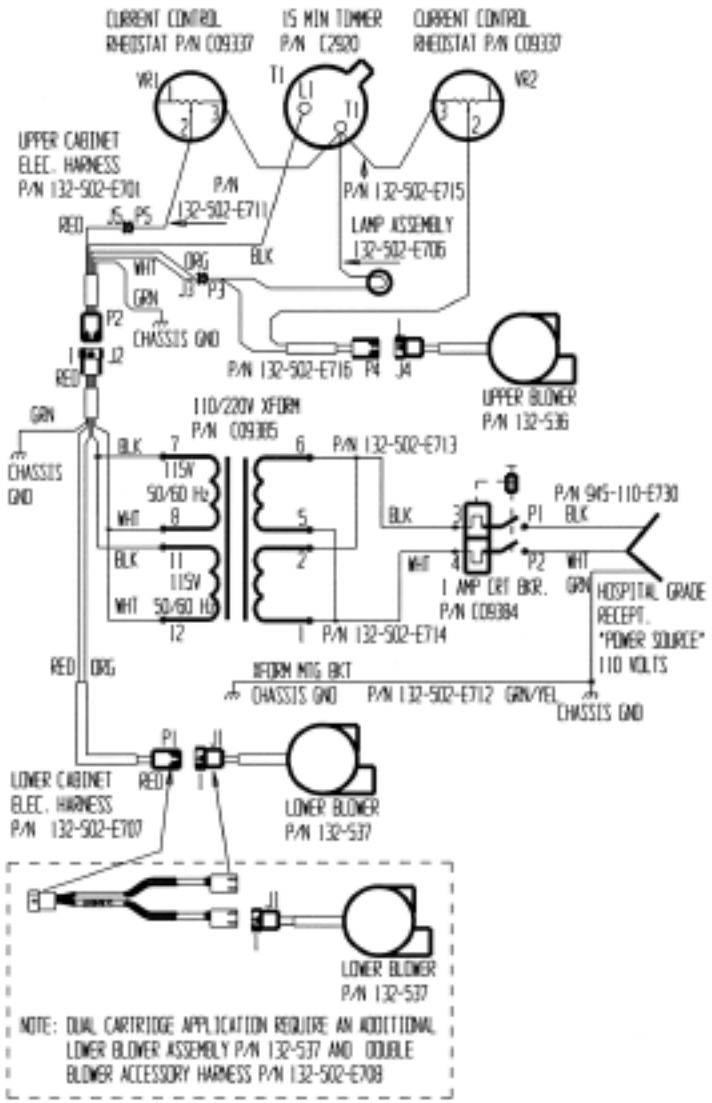
PULMONEX CABINET ASSEMBLY, 132-502-A010


132-502-A010 PULMONEX
CONTROL PANEL ASSY.
C08249 SETSCREW, #10-32 X .38 LG.
132-502-M421 MODIFIED HANDLE
132-502-M322 VALVE POINTER
C08496 #4 x 3/8" FLT. HD SCR
C09367 KNOB W/ SET SCR (3) PLS
C08496 SCR. PAN HD. 6-32X.375" (2) PLS.
C08001 AVR LOCTITE BLUE
C09371 JAM NUT 6-32" AVR LOCTITE BLUE
C09374 LATCH, KEEPER
C08688 SCR. PHIL HD #8-32 X 3/8 LG
C08001 AVR BLUE LOCTITE
C08802 JAM NUT, #8-32 AVR LOCTITE BLUE
132-502-M143 SUPPORT ARM, UPPER DOOR
C09372 NYLON WASHER (6 PLS)
132-502-M110 BASE DOOR WELDMENT
C09375 HANDLE, POCKET PULL
C09374 LATCH, CATCH
132-502-L001 LABEL DISPOSABLES ORDERING
C09373 HANDLE, DOOR PULL
132-502-A220 UPPER DOOR LEAD ASSY
C08846 WARNING; HOSPITAL GROUNDING DEVISE LABEL
NOTE: PLACE NEXT TO PWR. CORD
C08248 SCR. PAN HD #6-32 X .38 LG
C08001 AVR LOCTITE BLUE
132-537 LOWER FAN ASSEMBLY
C08625 HEX NUT, #10-32
NOTE: SECURE TO BLOWER MOUNTING BRACKET
C08512 HOSE CLAMP, 15/16" (2) PLS.
132-580 FLEXIBLE CORRAGUATED TUBING (2) SECTIONS "12 ING."
C08494 BAND CLAMPS 15/16"
132-580 FLEXIBLE CORRAGUATED TUBING 3 SECTIONS (18 INCHES) SEE NOTE BELOW
C08615 HEX NUT, 1/2-13 NOTE: LOCTITE RED (STRIP NUT ONLY)
C09387 TRICON KNOB
AVR LOCTITE RED
132-502-M140 CARTRIDGE STRAP BRACKET NOTE: SHORT SIDE INWARD
132-502-M318 THREADED ROD
NOTE: SECURE CARTRIDGE TO INSIDE CABINETS SIDE WALL
132-319 LEAD CARTRIDGE ASSEMBLY
C09472 SCR. HD FLT HD. #8 X 1.25
132-502-M316 TRAP WEDGE
DOUBLE TRAP CONFIGURATION
P/N 132-503 110V &
P/N 132-523 220V
(ADD TO LEFT SIDE OF CABINET)
NOTE: CONNECT TO 132-502-M328 7/8" BULKHEAD FITTING REFER TO SHEET #1
PART #132-502-A010 ITEM #25
PULMONEX SINGLE/DUAL TRAP FLOW DIAGRAM
UPPER CABINET
LOWER CABINET
TOP COMPARTMENT EXHAUST INTO DECAY CARTRIDGE
EXHAUST BLOWER (2)
18" HOSE
2" HOSE
12" HOSE
BLOWER (1) 18" HOSE
FRONT FITTING
REAR FITTING
FRONT REAR FITTING
(OPTIONAL) LEFT SIDE TRAP
RIGHT SIDE TRAP
SINGLE TRAP FITTING POSITIONS
DUAL TRAP (OPTIONAL) FITTING POSITIONS
REAR FITTING
FRONT FITTING
LEFT SIDE TRAP
RIGHT SIDE TRAP
C08365 SCR. BTN HD. 10-32X.375 AVR LOCTITE BLUE
130-504 BAND CLAMPS .68-1.12"
C09376 PINSTRIPE RED
132-502-A010 PULMONEX CABINET ASSEMBLY
C08847 FUSE
WARNING LABEL NOTE: PLACE BELOW CIRCUIT BREAKER
06121 DESC./SERIAL/MODEL LABEL
NOTE:
THE FOLLOWING ITEMS PACKED INSIDE UNIT FOR SHIPMENT.
132-510 ACCESSORY GOODY BAG
132-793 MASK D/O FILTER TYPE
130-019 1 LB. SODA LIME (CO2 ABSORBER)
139-101 1 LB. DRIERITE ABSORBER
096-005 SYSTEM MANUAL / WARRANTY CARD



SCHEMATICS


INTER-CONNECT TABLE 220 V PULMONEX
LOWER CABINET WIRING
UPPER CABINET WIRING
PART NUMBER
DESCRIPTION
TERMINATION FROM :
TERMINATION TO :
945-110-E741
DOMESTIC INPUT POWER CORD 110V
HOSPITAL GRADE RECEPT. * POWER SOURCE *
CIRCUIT BREAKER (CB-P2 (BRN) CB-P1 (BLUE) GRN/YEL CHASSIS GND
132-502-E717
CIRCUIT BREAKER TO XFORM (BLACK)
CIRCUIT BREAKER / CB-3 (BLK/WHT)
TRANSFORMER / XFMR-6 (BLK/WHT)
132-502-E718
CIRCUIT BREAKER TO XFORM (WHITE)
CIRCUIT BREAKER / CB-4 (WHT/RED)
TRANSFORMER / XFMR-1 (WHT/RED)
132-502-E719
XFORM (GREY)
TRANSFORMER / XFMR-2 (GREY)
TRANSFORMER / XFMR 5 (GREY)
132-502-E707
LOWER CABINET ELECTRONIC HARNESS
NOTE: J2 - PIN 5 (N/C)
J2 - PIN 3 (BLACK)
J2 - PIN 4 (WHITE)
J2 - PIN 1 (RED)
J2 - PIN 2 (ORANGE)
J1 - PIN 1 (RED)
J1 - PIN 2 (ORANGE)
J2 - PIN 6 (GREEN)
TRANSFORMER / XFMR-7 (BLK/WHT)
TRANSFORMER / XFMR-11 (BLK/WHT)
TRANSFORMER / XFMR-8 (WHT/RED)
TRANSFORMER / XFMR-12 (WHT/RED)
J1 - PIN 1 (RED)
J1 - PIN 2 (ORANGE)
P1 - PIN 1 (BLACK)
P1 - PIN 2 (BLACK)
LOWER CABINET CHASSIS GROUND
132-502-E712
XFORM MTG. BRKT TO CHASSIS GND CA.
XFORM MTG. BRACKET (GRN/YEL)
LOWER CABINET CHASSIS GROUND
132-537
LOWER BLOWER ASSY
BLOWER P1 - PIN 1 (BLK) BLOWER P1 - PIN 2 (BLK)
J1 - PIN 1 (BLK) J1 - PIN 2 (BLK)
UPPER CABINET WIRING
132-502-E701
UPPER CABINET ELECTRONIC HARNESS
NOTE: J2 - PIN 5 (N/C)
P2 - PIN 1 (RED)
P2 - PIN 2 (ORANGE)
P2 - PIN 3 (BLACK)
P2 - PIN 4 (WHITE)
P2 - PIN 6 (GREEN)
J5 TO RHEOSTAT
J3 TO UPPER BLOWER TIMER (1 1 1 "BLK"
J3 TO UPPER BLOWER UPPER CHASSIS GROUND
132-502-E711
RHEOSTAT TO UPPER BLOWER, CA.
PS (FAN PWR)
RHEOSTAT VR1 - 2 (BLK)
132-502-E715
TIMER TO RHEOSTAT'S CONTROL, CA.
TIMER (11 1
RHEOSTAT VR1 - 3 (BLK) RHEOSTAT VR2 - 3 (BLK)
132-502-E706
LAMP CABLE ASSEMBLY
TIMER (11)
J3 TO UPPER BLOWER
132-502-E716
LAMP / RHEOSTAT & BLOWER CA.
RHEOSTAT VR2 - 2 (BLK)
J3 TO LAMP POWER
132-536
UPPER BLOWER ASSY
BLOWER P4 - PIN 1 (BLK) BLOWER P4 - PIN 2 (BLK)
J4 - PIN 1 (BLK) J4 - PIN 2 (BLK)
CURRENT CONTROL RHEOSTAT P/N C09337
15 MIN TIMER P/N C2920
CURRENT CONTROL RHEOSTAT P/N C09337
VR1
VR2
T1
P/N 132-502-E715
LAMP ASSEMBLY 132-502-E706
P/N 132-502-E711
UPPER CABINET ELEC. HARNESS P/N 132-502-E701
P5
J5
P3
J3
P2
J2
P/N 132-502-E716 P4 J4
UPPER BLOWER P/N 132-536
110/220V XFORM P/N C09385
115V 50/60 Hz
P/N 132-502-E717
P/N 132-502-E719
P/N 945-110-E741
P1
P2
1/2 AMP CKT BKR. P/N C09389
HOSPITAL GRADE RECEPT. "POWER SOURCE" 220 VOLTS
GRN/YEL
CHASSIS GND
XFORM MTG. BKT
P/N 132-502-E712
P/N 132-502-E718
LOWER CABINET ELEC. HARNESS P/N 132-502-E707
LOWER BLOWER P/N 132-537
NOTE: DUAL CAPACITOR APPLICATION REQUIRE AN ADDITIONAL LOWER BLOWER ASSEMBLY P/N 132-537 AND DOUBLE BLOWER ACCESSORY HARNESS P/N 132-502-E708



INTER-CONNECT TABLE 110 V PLUMDEX

	PART NUMBER	DESCRIPTION	TERMINATION FROM :	TERMINATION TO :
LOWER CABINET	945-110-E730	DOMESTIC INPUT POWER CORD 110V	HOSPITAL GRADE RECEPT. * POWER SOURCE *	CIRCUIT BREAKER / CB-P2 (WHT/NEU) CB-P1 (BLK/HOT) GRN/YEL CHASSIS GND
	132-502-E713	CIRCUIT BREAKER TO XFORM (BLACK)	CIRCUIT BREAKER / CB-3 (BLK/HOT)	TRANSFORMER / XFMR-6 (BLK/HOT) TRANSFORMER / XFMR-2 (BLK/HOT)
	132-502-E714	CIRCUIT BREAKER TO XFORM (WHITE)	CIRCUIT BREAKER / CB-4 (WHT/NEU)	TRANSFORMER / XFMR-5 (WHT/NEU) TRANSFORMER / XFMR-1 (WHT/NEU)
	132-502-E707	LOWER CABINET ELECTRONIC HARNESS NOTE: J2 - PIN 5 (N/C)	J2 - PIN 3 (BLACK)	TRANSFORMER / XFMR-7 (BLK/HOT) TRANSFORMER / XFMR-11(BLK/HOT)
			J2 - PIN 4 (WHITE)	TRANSFORMER / XFMR-8 (WHT/NEU) TRANSFORMER / XFMR-12(WHT/NEU)
			J2 - PIN 1 (RED) J2 - PIN 2 (ORANGE)	J1 - PIN 1 (RED) J1 - PIN 2 (ORANGE)
			J1 - PIN 1 (RED) J1 - PIN 2 (ORANGE)	P1 - PIN 1 (BLACK) P1 - PIN 2 (BLACK)
			J2 - PIN 6 (GREEN)	LOWER CABINET CHASSIS GROUND
	132-502-E712	XFORM MTG BKT TO CHASSIS GND CA.	XFORM MTG. BRACKET (GRN/YEL)	LOWER CABINET CHASSIS GROUND
	132-537	LOWER BLOWER ASSY	BLOWER P1 - PIN 1 (BLK) BLOWER P1 - PIN 2 (BLK)	J1 - PIN 1 (BLK) J1 - PIN 2 (BLK)
UPPER CABINET	132-502-E701	UPPER CABINET ELECTRONIC HARNESS NOTE: J2 - PIN 5 (N/C)	P2 - PIN 1 (RED) P2 - PIN 2 (ORANGE) P2 - PIN 3 (BLACK) P2 - PIN 4 (WHITE) P2 - PIN 6 (GREEN)	J5 TO RHEOSTAT J3 TO UPPER BLOWER TIMMER (L1) "BLK" J3 TO UPPER BLOWER UPPER CHASSIS GROUND
	132-502-E711	RHEOSTAT TO UPPER BLOWER, CA.	P5 (FAN PWR)	RHEOSTAT VR1 - 2 (BLK)
	132-502-E715	TIMMER TO RHEOSTAT'S CONTROL, CA.	TIMMER (T1)	RHEOSTAT VR1 - 3 (BLK) RHEOSTAT VR2 - 3 (BLK)
	132-502-E706	LAMP CABLE ASSEMBLY	TIMMER (T1)	J3 TO UPPER BLOWER
	132-502-E716	LAMP / RHEOSTAT & BLOWER CA.	RHEOSTAT VR2 - 2 (BLK)	J3 TO LAMP POWER
	132-536	UPPER BLOWER ASSY	BLOWER P4 - PIN 1 (BLK) BLOWER P4 - PIN 2 (BLK)	J4 - PIN 1 (BLK) J4 - PIN 2 (BLK)

NOTES

BIODEX
Biodex Medical Systems, Inc.
20 Ramsay Road, Shirley, New York, 11967-4704, Tel: 800-224-6339 (*In NY and Int'l, call 631-924-9000),* Fax: 631-924-9241, Email: sales@biodex.com, www.biodex.com